

7-1975

# Human Skeletal Remains from Kato Zakro

Marshall Joseph Becker

*West Chester University of Pennsylvania*, [mbecker@wcupa.edu](mailto:mbecker@wcupa.edu)

Follow this and additional works at: [http://digitalcommons.wcupa.edu/anthrosoc\\_facpub](http://digitalcommons.wcupa.edu/anthrosoc_facpub)



Part of the [Archaeological Anthropology Commons](#)

---

## Recommended Citation

Becker, M. J. (1975). Human Skeletal Remains from Kato Zakro. *American Journal of Archaeology*, 79(3), 271-276. <http://dx.doi.org/10.2307/503482>

This Article is brought to you for free and open access by the College of Arts & Sciences at Digital Commons @ West Chester University. It has been accepted for inclusion in Anthropology & Sociology by an authorized administrator of Digital Commons @ West Chester University. For more information, please contact [wcressler@wcupa.edu](mailto:wcressler@wcupa.edu).

# Human Skeletal Remains from Kato Zakro\*

M.J. BECKER

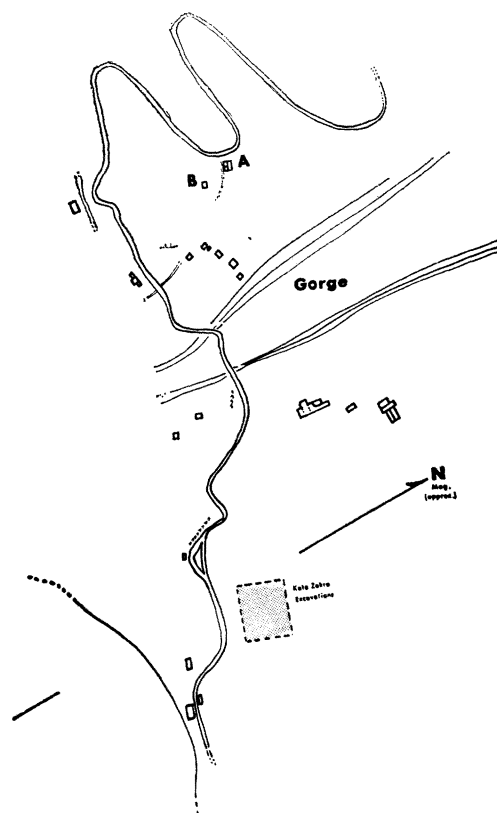
PLATE 47

Kato Zakro, a well known Minoan site on the eastern shore of the island of Crete, has been the subject of archaeological studies since the very beginning of this century. Prof. N. Platon (University of Thessaloniki) invited the author to join the excavation team during the 1973 field season to examine human skeletal remains recovered from the nearby Pezoules Kephala tomb enclosures, and to assist in drawing two major sections of the site.

Hogarth's excavations in the central part of Zakro in 1901 produced no human skeletal remains. However, human remains were recovered from caves located within the gorge.<sup>1</sup> R.B. Seager obtained a permit "to go to Zakro to try for the cemetery" (letter to G. Richter 15 March 1924) and spent two weeks in May in a futile attempt to locate the burial area.

Hogarth<sup>2</sup> produced a sketch map of the Zakro River delta which depicts the entire area around the site, including the location of the Pezoules Kephala tomb enclosures. These are located along the trail to Apano Zakro to the west of the Zakro River and above the level of the first hills (ill. 1). Prof. Platon's excavations have extended our general knowledge of the site proper, and his publications should be consulted for a comprehensive understanding of the site.<sup>3</sup> The 1973 excavations produced evidence that the ancient shoreline may have been immediately adjacent to the present excavation limits at the site. Thus the marshy area depicted by Hogarth has probably been silted in over the past 3,000 years, producing a fertile plain which

is now under intensive cultivation. Although burials have been recovered from the gorge and the Pezoules Kephala area, no Late Minoan burials—



ILL. 1. Sketch map locating the Pezoules Kephala tomb enclosures west of Kato Zakro

\* The findings reported here were summarized in a paper presented at the Seventy-fifth General Meeting of the Archaeological Institute of America in December 1973. I would particularly like to thank Prof. N. Platon, the excavator of these tomb enclosures, for his kind permission to analyze this material and to conduct further salvage work at Kato Zakro during the 1973 field season. Prof. and Mrs. Platon extended every courtesy to the author while he assisted them at Kato Zakro. Thanks are also due Mr. Stylianos Alexiou, Director of the Heraklion Museum, for his permission to examine the skeletal remains stored in the museum. Both Mr. Alexiou and the Assistant Director, Miss A. Lebesi, provided every possible consideration in furthering this research. Prof. Spyridon Marinatos was extremely kind in taking time from his busy schedule to assist in searching for some of this material which

had been transferred to the National Archaeological Museum in Athens.

Special thanks are due H.S. Georgiou for her kind assistance in acting as translator and recorder in the examination of this material. Without her help none of this work would have been possible. Thanks are also due J. Lawrence Angel for his many suggestions and continued help, which have been of enormous benefit to the author.

<sup>1</sup> W. Boyd Dawkins, "Skulls from cave burials at Zakro," *BSA* 7 (1901) 150-55.

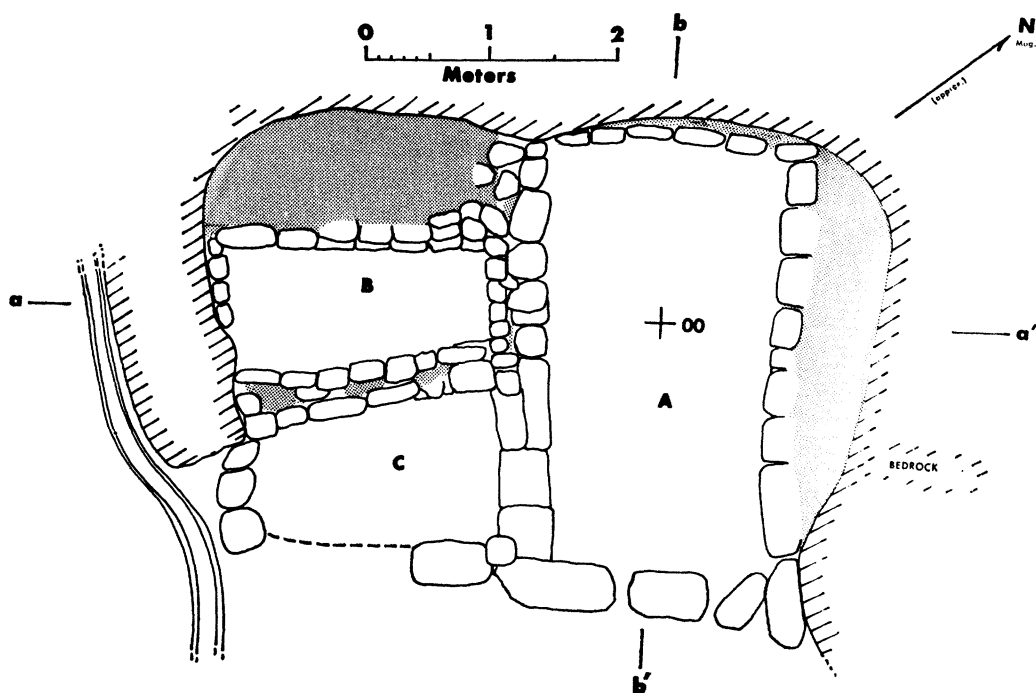
<sup>2</sup> D.G. Hogarth, "Excavations at Zakro, Crete," *BSA* 7 (1901) 121-49.

<sup>3</sup> N. Platon, *Zakros: The discovery of a lost palace of ancient Crete* (New York 1971).

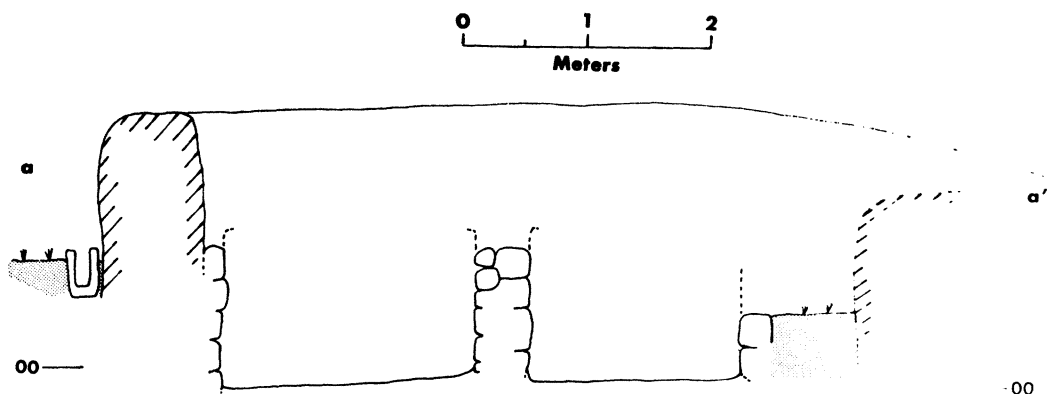
contemporary with the florescent period—have been located to date.

Recently, irrigation networks constructed at Apáno Zakro have drained off most of the waters which fed the lower reaches of the Zakro River. The river has thus become a dry stream bed with only rare surface water flow. This is important in the discovery of the tomb enclosures because water used in Kato Zakro now comes from above, not via, the river, primarily through an irrigation system which has been constructed in recent years. The discovery of the Pezoules Kephala enclosures resulted from the construction in 1967 of an irrigation channel

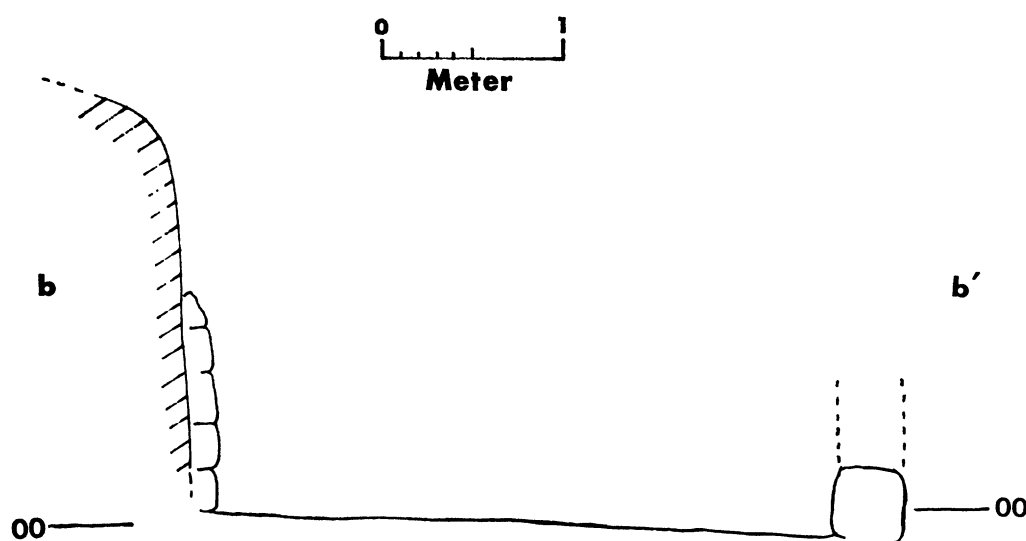
which revealed the southern edge of Enclosure A (ills. 1-3). A farmer brought several ceramic objects to Prof. Platon for inspection. Prof. Platon investigated the find site and determined that the objects had been recovered from a rockcut tomb. A second enclosure was located nearby. The location of these tomb enclosures in the low hills overlooking ancient Zakro would suggest that they are part of the burial zone which served the Middle Minoan population. When these enclosures were located an unscheduled salvage excavation was in order. Prof. Platon, then in the middle of an extremely busy field season, had to divide his crew



ILL. 2. Plan of Tomb Enclosure A



ILL. 3. Tomb Enclosure A, Section a-a'



ILL. 4. Tomb Enclosure A, Section b-b'

and attention to recover data from these complex tombs. No time was available to bring in a physical anthropologist to assist in this project.

Prof. Platon's excavation records suggest that Chamber A of Enclosure A had been used for new interments, with Chambers B and C having been used to hold bones and artifacts associated with earlier burials. Disarticulated bones were found in every chamber as well as "outside" the chambers.<sup>4</sup> The two articulated burials visible in photographs of Enclosure A suggest that individuals were placed inside the chamber intact, with various burial offerings. These articulated burials, however, are not included in this analysis. When new burials were added, bones of former "occupants" were relocated after being disarticulated. The apparent threshold between Chambers A and C in Enclosure A (ills. 2-4) suggests that this was the usual path of entry. Chamber C may have been sealed off in antiquity or may have had an entry which is not archaeologically discernible.

Enclosure B (ill. 1) appears to be a simple rectangle. In 1973 no evidence of built walls could be found, although the chamber is clearly evident in the rock. A great number of small vessels were located in the enclosures. Prof. Platon believes that

these may be Middle Minoan I, but the necessary diagnostic vessels do not appear to be part of these assemblages. Thus the date suggested is only an approximation based on reasonable interpretation of the ceramic inventory.

The solid construction of the walls of Enclosure A and the height to which they now stand suggest that these tombs were roofed, perhaps with beams and mortar or beams and stone slabs. Prof. Platon does not believe that these chambers were roofed, but rather that they were earth filled.<sup>5</sup> Each new interment would have been introduced, or intruded, by a separate excavation.

Prior to examining the skeletal material excavated in 1967 a second and very brief salvage operation was undertaken during the 1973 field season in order to acquaint the analysts with the physical situation of the finds. This search resulted in the recovery of additional skeletal material including several teeth. A large proportion of this material came from Chamber B of Enclosure A.<sup>6</sup>

As noted above, the majority of the skeletal remains from these enclosures are extremely fragmentary. Analysis of even the most basic areas of concern—age and sex—thus becomes a most difficult task. The bones recovered in 1973 were tenta-

<sup>4</sup> N. Platon, "Zakro," *To Ergon* (1968) 103-15; and, "Anaskaphi Zakrou," *Praktika* (1969) 162-94, plates 153-73.

<sup>5</sup> Platon (*supra* n. 3).

<sup>6</sup> The human skeletal material recovered in 1973 was studied together with the material from the 1967 excavations stored in the Heraklion Museum. Of the 69 "crania" identified in

1967 only 62 could be immediately located. The remaining seven specimens were in other storage locations and will be studied at a future date. The late Prof. Sp. Marinatos was most helpful in initiating a search for the material from these enclosures at Zakros which was taken to the National Archaeological Museum in Athens for study and reconstruction.

tively examined in the field. At the conclusion of the field season the skeletal remains excavated in 1967 were sought from the storage areas of the Heraklion Museum. Three large wooden containers were removed from storage and found to contain 62 separately bagged and labelled "crania." Prof. Platon's field notes list 69 crania, of which seven could not be located. Twelve of the 62 bags which were located contained the remains of a second individual, usually represented by duplicate skull or jaw fragments. Quite possibly these twelve "second" individuals are simply miscellaneous and misplaced bones of other individuals who were recognized by the excavators. However, each was treated as a separate individual, thus bringing to 74 the number of people represented in this "population." In no case were extensive postcranial remains associated with any cranium. The fragmentary remains of these 74 possible individuals provide the basis for the following analysis.

The evaluation of stature was made extremely difficult by the fragmentary nature of the remains and by the emphasis in the original salvage excavation on the recovery of cranic fragments. Only one bone recovered during the 1967 operation was found to be intact, and none of the fragments could be assembled into a complete specimen. In addition, a number of long bone fragments recovered

in 1973 could be pieced together, but no entire bones were reconstructed. The work of Steele and McKern<sup>7</sup> on the analysis of fragmentary skeletal remains thus proved extremely useful in calculating the stature of the people represented by these bones. The regression formulae used by these authors together with the formulae presented by Trotter and Gleser<sup>8</sup> have been used to calculate stature. Males in this population average 167 cm. in stature, with considerable variation. Women were found to be somewhat shorter, averaging 157.5 cm. in stature, based on a slightly larger sample of long bone fragments. These figures are less than two cm. greater than those which J.L. Angel (personal communication) has achieved by reworking Duckworth's data for the Middle Minoan period.<sup>9</sup> Angel calculated a stature of 165.4 cm. for males, based on a sample of 7, and 155.1 for females, based on a sample of three.

The figures in Table 1, based primarily on cranic fragments, suggest that there were many more females than males in these chambers. The evidence from the long bone fragments, however, does not support this conclusion.

The absence of complete skeletons does not allow a detailed or complete description of pathologies, but those which were noted are briefly listed as an indication of the "health status" of these peo-

#### OSTEOLOGICAL FINDINGS

Age and sex evaluations are summarized below in Table 1.

	Totals	Child 6-10	Adoles- cent 14-16	Young Adult 18-25	Adult 26-50	Mature Adult 50+	Very Mature Adult	?
Male	18			4	7	7		
Male?	8			1	5	2		
??	8	1	1	1	4	—		1
Female?	6				5	1		
Female	34		2	5	15	8	1	3
	—	—	—	—	—	—	—	—
	74	1	3	11	36	18	1	4

With the 7 not located the total possible number is 81.

TABLE 1: AGE AND SEX DISTRIBUTION  
OF THE PEZOULES KEPHALA POPULATION

<sup>7</sup> D.G. Steele and T.W. McKern, "A method for assessment of maximum long bone and living stature from fragmentary long bones," *American Journal Physical Anthropology* 31 (1969) 215-28.

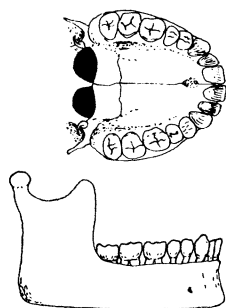
<sup>8</sup> M. Trotter and G.G. Gleser, "A re-evaluation of estimation of stature based on measurements of stature taken during life

and long bones after death," *American Journal Physical Anthropology* 16 (1958) 79-123.

<sup>9</sup> W.L.H. Duckworth, "Archaeological and ethnological researches in Crete," *Report of the Brit. Assn. for Advancement of Science*, Dundee 1912 (1913) 224-68.

ple. Several large exostoses were noted, as well as arthritic lesions at finger joints. Fragmentary pieces of vertebrae suggest at least two cases of spondylolisthesis. Abscessed mastoids, a significant case of severe sinus infection, and innumerable cases of periodontal problems were also observed. Indeed, of all the health problems observed dental disease appears to have been the most rampant, affecting almost every individual in the population.

Ill. 5 depicts an ideal human dentition. The maxillary, or upper-jaw, appears in plan above



ILL. 5. "Ideal" human dentition

while the mandibular dentition is drawn as a right profile. All teeth are shown here in an unworn condition, which would not be expected in most adult populations. The alveolar margin, or "gum line," of the mandible is shown with slight to medium resorption of the bone.<sup>10</sup> This illustration only mildly suggests the kind of effects which can be wrought by periodontal disease. The Pezoules Kephala burials had both high caries incidence as well as extreme periodontal problems, resulting in extensive tooth loss.

In addition to the high incidence of caries, extensive tooth wear on the articular surfaces of the teeth is commonly noted in almost all individuals (see pl. 47, fig. 1). This wear is typical of populations eating a coarse milled cereal grain diet, probably as a result of two factors. First, the use of stone tools to grind the grain adds significant quantities of tooth-wearing grit to the diet in addition to that which is already present in vegetables. Second, sand and grit already in the environment may be increased through the use of poorly fired ceramic cooking vessels. Siliceous or quartz tempers as well as less abrasive inclusions in the clays used for pots tend to be included in the food cooked in such

vessels, and to a lesser extent in better made wares. All such household cooking ceramics tend to contribute to the abrasive substances found in the diet, and thereby add to the problems of dental wear.

When the intact dentition of an adult member of this population is examined (pl. 47, fig. 1) one can readily see that the abrasive action has had rapid and extensive effects. The first molar, commonly termed a "six year molar" because it tends to erupt at about that age, has been extensively worn in almost all the adults from the Pezoules Kephala tomb enclosures. Generally, this first molar has been worn almost flat by the time the second, or "twelve year molar," has erupted. The continuing wear may lead to the cusps of these second molars being extensively worn by the time the "wisdom" teeth erupt, at about age 18-20. The teeth of the individual designated as A5a, one of the few mature individuals in this population who had teeth, demonstrate this process of dental wear. The evaluation of the cranial sutures of this individual places the age at death as only 30 years. Note the slight impaction of the left third molar.

An even more typical representative of this population is individual B3, who is believed to have died at about age 25. He has already suffered some antemortem molar loss and extensive dental wear. The survival of an intact set of teeth which has had only minimal effects of wear (ill. 5) would be expected in a modern population with a soft, well-cooked diet including finely milled cereal grains. Such a diet, however, might lead to other problems which could result in extensive tooth loss.

As indicated by this sample of dentition the rate of dental decay at Kato Zakro during the MMI period appears to be extremely high, but a high rate is not evident in the following figures due to the *extremely* high rate of antemortem loss. Of the 408 tooth spaces which were evaluated fully 151 teeth (37 percent) had been lost antemortem. Post-mortem loss of 105 teeth leaves but 152 teeth in situ to evaluate, of which only 11 (7 percent) were found to have caries. The extensive tooth loss, of course, leaves relatively few teeth to become carious. Furthermore, loss accelerates rapidly with age. Many of these people had lost all or almost all of their teeth by age 40. In many cases resorption of the alveolar margin, or bony tissue forming the tooth socket, was complete long before death.

<sup>10</sup> D.R. Brothwell, *Digging up Bones* (London 1963) 150; and also C. Wells, *Bones, bodies and disease* (New York

1964).



This review of a few of the dental and osteological aspects of the interments in the Pezoules Kephala tomb enclosures at Kato Zakro indicates the potential of such studies for providing information about the ancient inhabitants of the area. Until recently very few of the techniques of modern physical anthropology have been used in dealing with human skeletal material from ancient Crete.<sup>11</sup> The analysis of these remains is of some value not only in providing information regarding the lives of these inhabitants of Kato Zakro, but also in providing comparative data for students of Cretan prehistory. Prof. Jonathan Musgrave has already begun an extensive program of osteological analysis at Knossos. By co-ordinating the research efforts now underway at several sites the resultant product should be considerable. Furthermore, by following the examples set by the work of Dr. J. Lawrence Angel<sup>12</sup> in other parts of Greece and in Turkey, the combined results should be useful in studying and understanding the prehistory and early history of the Aegean area in terms of human biology.

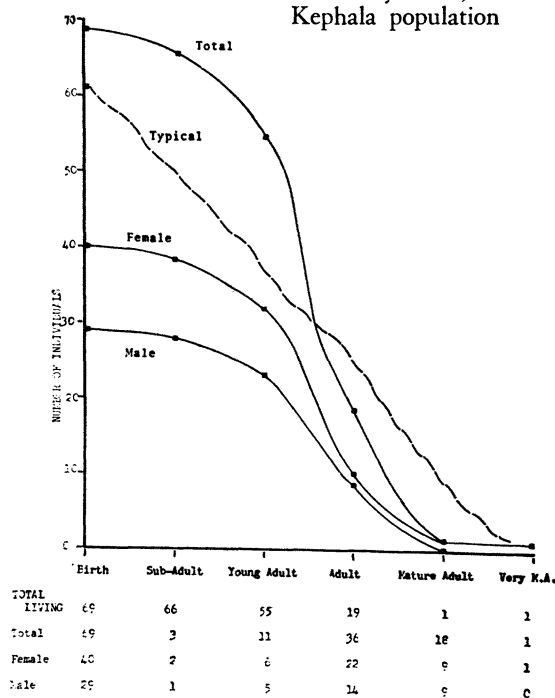
#### SUMMARY

The analysis of the fragmentary cranial remains from the Pezoules Kephala tomb enclosures suggests that there may have been as many as 81 individuals present. However, the remains of only four subadults were recovered in these salvage excavations; a child of 6-8 years and 3 adolescents. The lack of infants and the small number of subadults is unusual in any skeletal population. Two possible explanations might be considered. First: the people in or around Kato Zakro at the time of the construction and use of these tombs had at least two distinct sets of mortuary behavior—one for adults and one for subadults (individuals under eighteen years of age). The treatment of the remains of children or adolescents may have led to the skeletons being placed outside of the tombs. Second: extensive destruction by natural processes and possible collapse of the tombs may have made difficult the detection of subadults during excavation. The more fragile structure of subadult skeletal

remains leaves them more susceptible to such forces, as well as to damage which may occur during the excavation process.

Several observations made during this analysis are of particular note. This relatively small sample of skeletal material offers considerable evidence of dental disease and osteological problems. An extremely high rate of antemortem tooth loss may reduce the statistical incidence of dental caries, which are common in this sample. Periodontal problems are the rule for these people. This population appears to have had a high death rate between the ages of 18 and 50 (ill. 6). Taken together these fac-

ILL. 6. Mortality curve, Pezoules Kephala population



tors suggest that this population was not a "healthy" group in modern terms despite the high artistic and technological achievements of the Middle Minoan period.

#### WEST CHESTER STATE COLLEGE

<sup>11</sup> Dawkins (supra n. 1); Duckworth (supra n. 9); F. von Luschan, "Beitrag zur Anthropologie von Kreta. A. Alte Schädel." *Zeitschrift für Ethnol.* 45 (1913) 320-43; G. Sergi, "Notes upon the skulls of Erganos," *AJA* 5 (1901) 315-18.

<sup>12</sup> J.L. Angel, "Skeletal change in ancient Greece," *American Journal Physical Anthropology* 4 (1946) 69-97; "Porotic hyperostosis, anemias, malarias and marshes in the prehis-

toric Eastern Mediterranean," *Science* 153 (1966) 760-63; "Porotic hyperostosis or osteoporosis symmetrical," in *Diseases in Antiquity*, Brothwell and Sandison, eds. (Springfield, Illinois 1967) 378-89; "Paleodemography and evolution," *American Journal Physical Anthropology* 31 (1969) 343-53; "Human skeletons from Grave Circles at Mycenae," in *Grave Circle B at Mycenae*, by G.E. Mylonas (Athens 1973) 379-97.

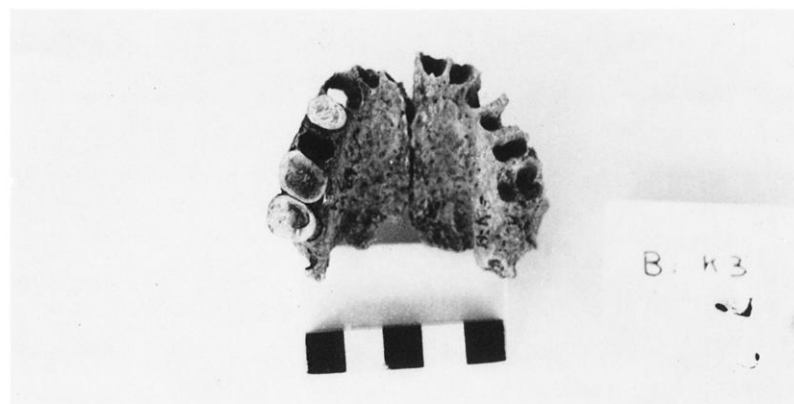
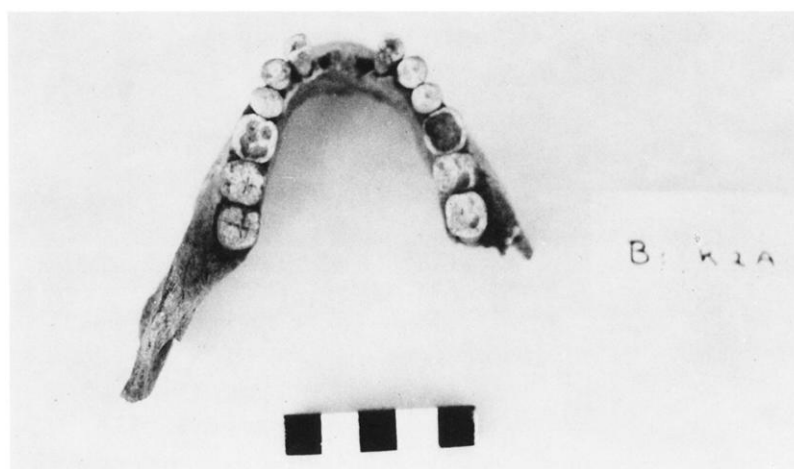


FIG. 1. Dentition from the Pezoules Kephala tombs (A5, B2a, B3)